



Original Article

Association between Blood Groups and Refractive Errors**A**uthor's Affiliation

Mubin Zahra

Dr. Arif Hussain

Correspondence Author:

Correspondence to:

Dr. Arif HussainCollege of Ophthalmology &
Allied Vision Sciences (COAVS).

Purpose: To find out association between blood groups and refractive errors and to overcome the problems producing due to this association by proper counseling.

Study Design: Descriptive cross sectional study.

Method: This study was conducted at refraction clinic, College of Ophthalmology & Allied Vision Sciences from 15th September 2015 to 15th December 2015. A total of 50 patients having age group 15-40 years of both genders were enrolled in the study. The patients having other eye diseases and blood dyscrasias were excluded from the study.

Results: Out of 50 patients, 30 patients (60%) of myopia were presented between 15 to 35 years of age. No hyperopic patient was present between 40 to 50 years of age. 16(32%) out of 50 patients were having blood group O and myopia while only 12(24%) out of 50 patients were associated with blood group A and B. Only 3(6%) hyperopic patients were having blood group A and O while 4(8%) were associated with blood group B.

Conclusion: Blood group O shows slight pre-dominance to myopia while other blood groups showed no specific association with other refractive errors. The association however was not significant statistically

Key words: Blood groups, refractive errors

Introduction:

Blood is the basic fluid of life and if it does not exist, the working of human body will come to end. Blood consists of two types of important parts, serum and cells. The blood cells are formed by bone marrow. The serum of some people shows reaction to red blood cells of other people. This discovery led to identification of ABO blood system. Due to different reactions between serum and RBCs, scientists divide it into four groups A, B, O and AB. The types of these blood groups are determined by the antigen present on surface of RBCs. Blood group O is universal donor and AB is universal recipient.

There are three types of refractive errors Myopia, Hyperopia, and Astigmatism. Myopia is a type of refractive error in which the parallel rays of light coming from infinity are focused in front of retina. The axial length of eye is increased. Hyperopia is a type of refractive error in which the parallel rays of light entering in eye are focused behind the retina. The axial length of eye is reduced³. Myopia and Hyperopia are the main cause of decreased vision and more common refractive errors in population. Myopia is known as near sightedness and Hyperopia is known as far sightedness. Many factors are responsible for causing the myopia which may include the physical activities, habits or diet and these are controllable factor but some uncontrollable factors may cause near sightedness such as genetics and age. Myopia is more common in men than women whereas Hyperopia is more prevalent in women. The prevalence of myopia is decreased in 40 to 49 years of age but increased after 60 year of age. The prevalence of Hyperopia, on the other hand, is increased from 40 to 49 years of age but decreases afterwards⁴.

Some diseases are specific in some special type of blood groups as involvement of "A" blood group was found more in angina pectoris and myocardial infarction patients but less common in blood group "O"⁵.

In refractive error shape of eye avert the light from focusing on the retina. The axial length of eye ball changes with age. It is found that the person with blood groups O may have high risk of migraine and hypertension. Researchers took a significant sample size for that study. Similar results were found before and after correction of refractive errors⁶. Blood groups have inherited origin because of inherited character of refraction originates from two sources i.e. from research of twins and study of families⁷. Different studies were done and result show that genetic factors also has major effect on myopia⁸.

Myopia association with higher IQ has also been found and they can get school achievements better because mostly myopic children are more intelligent. This affiliation is mostly determined by genetic and environmental factors. There may be similar gene responsible for eye growth and

size⁹. So study of genetics concerned with refractive errors may allocate the treatment to prevent the series. Timely genetic detection of refractive errors with blood groups can be useful for efficient screening and also provide the pathway involved in eye development. Twins study shows that myopia is inherited⁹. The study for association of blood groups with different ocular condition such as Glaucoma has also been done. Blood groups ABO and Rh allele were used for this purpose and concluded that B blood group is associated with all type glaucoma while Rh allele shows relation with primary open angle glaucoma¹⁰. Myopia, Hyperopia also has some association with essential hypertension¹¹.

Results:

Table 01: Blood Groups & Refractive errors

Description	No. of Patients	Myopic	Hyperopic
Blood Group A	15	12	3
Blood Group B	16	12	4
Blood Group O	19	16	3
TOTAL	50	40	10

Blood Group & Refractive Errors

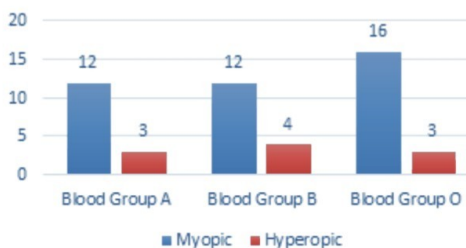


Table No. 01 shows that out of 50 patients 15 (30%) were having blood group A, 16 (32%) were having blood group B and 19 (38%) were having blood group O. Chi square value is 0.4605 and p value 0.79 which is not significant. So we conclude that there is no association between ABO blood groups and refractive errors.

Discussion:

Refractive errors are main cause of decreasing vision. It may appear in early age of life. As discussed above, it is not a disease but a condition of an eye in which parallel rays does not focus at a point on retina. These may be categorized in Myopia, Hyperopia and Astigmatism. This study was conducted basically to find out the association of refractive error with the blood groups. It results in such a manner that Hyperopia does not shows any specific association with any of the blood group while on the other hand myopia is seen slightly pre-dominant in persons having O-blood group.

In many previous studies, it is seen that etiology of refractive errors especially the myopia are un-identified but it may associate genetically. Reading, writing, outdoor exposure and family history are commonly seen as a major risk factor for causing myopia¹².

Therefore, to identify this familial association, this study was conducted. In general, it is seen that if any of the parents having any type of refractive error then there is more chances of getting that type of refractive error in infants. High myopia is greatly found as a familial condition due to exchange of DNA patterns from parent to their offspring. One more study briefly describes it as a locus of high myopia is present on chromosome that contributes the possibility of high myopia. Hence, these studies confirm the inherited heterogeneity of near sightedness, the myopia. Myopia and Hyperopia are widely considered as a cause of visual impairment. Both types of refractive error are associated with the genetic arrangement of loci on chromosomes. This discussion found in this study was that the influencing factors for both of the refractive errors are environmental changes and genetic information¹³.

Conclusion:

There is no statistically significant association between ABO Blood groups and refractive errors. This study was limited due to short time and sampling methodology but further studies are needed to explore this association.

References:

1. Padma T, Murty JS. Association of genetic markers with some eye diseases. *Acta Anthropogenet.* 1983;7(1):1-12.
2. Stambolian D. Genetic susceptibility and mechanisms for refractive error. *Clinical genetics.* 2013;84(2):102-8.
3. Boyd K. Farsightedness: What Is Hyperopia? *American Academy of Ophthalmology* Sept. 1, 2013. [Serial Online][Cited November 2014] Available from URL: <https://www.aao.org/eye-health/diseases/hyperopia-farsightedness>.
4. Wu SY, Nemesure B, Leske MC. Refractive errors in a black adult population: the Barbados Eye Study. *Investigative ophthalmology & visual science.* 1999;40(10):2179-84.
5. Akhund IA, Alvi IA, Ansari AK, Mughal MA, Akhund AA. A study of relationship of ABO blood groups with myocardial infarction and angina pectoris. *Journal of Ayub Medical College, Abbottabad : JAMC.* 2001;13(4):25-6.
6. Nishi K, Gupta NK, Sharma SC. Study on the Incidence of Hypertension and Migraine in ABO Blood Groups. *ISCA Journal of Biological Sciences.* 2012;1(2):12-16.
7. LT, Young M, Ravikanth Metlapally. Amanda E. Shay M. *Complex Trait Genetics of Refractive Error.* 2007;125(1).
8. Czepita D, Mojsa A, Ustianowska M, Czepita M, Lachowicz E. The effect of genetic factors on the occurrence of myopia. *Klinika oczna.* 2011;113(1-3):22-4.
9. Czepita D, Lodygowska E, Czepita M. Are children with myopia more intelligent? A literature review. *Annales Academiae Medicae Stetinensis.* 2008;54(1):13-6.
10. Khan MI, Micheal S, Akhtar F, Naveed A, Ahmed A, Qamar R. Association of ABO blood groups with glaucoma in the Pakistani population. *Canadian journal of ophthalmology Journal canadien d'ophtalmologie.* 2009;44(5):582-6.
11. Karadayi K, Akin T, Ciftci F, Top C, Keskin O, Kardesoglu E, et al. The association between hypermetropia and essential hypertension. *American journal of ophthalmology.* 2005;140(3):446-53.
12. Adamiec J, Nizankowska MH. [Familial high myopia--challenge of modern genetics]. *Klinika oczna.* 2003;105(1-2):106-8.
13. Lam DS, Tam PO, Fan DS, Baum L, Leung YF, Pang CP. Familial high myopia linkage to chromosome 18p. *Ophthalmologica Journal international d'ophtalmologie International journal of ophthalmology Zeitschrift fur Augenheilkunde.* 2003;217(2):115-8.